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Maxxum 4

Maxxum 4 is among the most advanced, hypoallergenic, multivitamin, multimineral, multiantioxidant supplements available, featuring some of the best-utilized nutrient forms known. The formula is designed to combine the benefits of a quality vitamin-mineral supplement with additional, cutting-edge ingredients such as alpha-carotene, lutein, lycopene, and quercetin. The ratios between the ingredients are carefully chosen to provide a balanced and complete core nutritional formula with the convenience of a single bottle.

Maxxum 4 is designed to be taken six capsules daily. This provides several advantages over a conventional one-a-day multi. Most obviously, a six-capsule formula can be made considerably more potent than a single tablet, literally allowing space for optimal dosages. Also, however, it helps insure more complete absorption, both because of the free powder form of the capsule (as opposed to a tablet) and because of the spreading-out of a large total daily regimen into several smaller, titrated doses. As well, such a protocol maintains optimal levels of water-soluble vitamins throughout the day. The old anti-supplement shibboleth that "North Americans have the most expensive urine in the world" because of excretion of vitamins does have a kernel of truth to it: the body does indeed pass nutrients such as vitamin C, bioflavonoids, and B-complex on an ongoing basis, so that optimal levels are reduced to "normal" levels within four to five hours. To maintain optimal levels, then, it is necessary to replenish these substances regularly. Taking two capsules with each meal, for instance, provides a regimen which will help insure continuous protection by these nutrients.

Vitamin A: Many multivitamin formulas choose not to include retinol because of exaggerated fears of overdose, choosing instead to include only beta-carotene. While carotenoids can be converted into retinols, the rate of doing so may not be optimal to support vitamin A's vital functions in supporting immune defense via enhancing gap junction communication and support for the thymus gland.

Mixed Carotenoids: Beta-carotene is well-known and well-represented in typical multivitamin formulas for its function as an anticarcinogenic antioxidant quencher of singlet oxygen (O₂). Early excitement over the strong epidemiology linking high dietary intake of this member of the carotenoid family with lower incidence of lung and other cancers (1) was overshadowed by its poor performance when administered alone in the CARET (2) and ATBC trials (3), although trials using it in combination with other antioxidants have shown protective effects (4). Explanations for this phenomenon vary, but one quite probable explanation for the discrepancies may lie with the fact that beta-carotene is never found alone in the diet, but comes with other carotenoid compounds. Supplementation with beta-carotene alone may actually inhibit transport of other carotenoids into the body, as they share a common, limiting

180 Capsules 1004H

Six capsules contain:

Vitamin A(Palmitate) 10 000 IU

Natural Mixed Carotenoids:

Beta-carotene 20 000 IU

Alpha Carotene 5mg

Lutein 1mg

Lycopene 1mg B-Complex

B1(Thiamine) 50mg

B2(Riboflavin) 50mg

B3(Niacinamide) 50mg

B5(d-Ca Pantothenate) 50mg

B6(Pyridoxine HCl) 100mg

B12(Cyanocobalamin) 200mg

Folic Acid 800mcg

Biotin 300mcg

Choline(Bitartrate) 50mg

Inositol 50mg

Vitamin C 1,000mg

Bioflavonoids:

Mixed Citrus 200mg

Quercetin 35mg

Vitamin D3 400IU

Vitamin E (d-alpha tocopheryl succinate) 400IU

Vitamin K1 50mg

Calcium(Citrate, Malate, carb) 300mg

Chromium* 200mg

Copper* 2mg

Magnesium (Citrate, Malate, Oxide) 300mg

Manganese* 20mg

Molybdenum* 50mg

Selenium(selenomethionine)200mg

Silicon(micronized) 100mg

Vanadium* 75mg *(Amino Acid Chelate)

Excipient: Rice flour

Suggested Use Six capsules daily, taken in divided dose, with meals.

Main Applications Core multivitamin.

of other carotenoids into the body, as they share a common, limiting absorption pathway (55). Along with natural-source beta-carotene, Maxxum 4 includes several rising star family members: alpha carotene, which is more effective at chemoprevention than beta-carotene in vitro; lutein and zeaxanthin, which have strong epidemiological links to reduced risk of macular degeneration (7); and lycopene, which is not only linked to dramatically lower risk of prostate (8) and other (9) cancers, but has recently been shown in a double-blind, placebo-controlled trial to regress prostate cancer cells in victims and possibly induce differentiation (10). A patient taking only beta-carotene is only hearing the horn section of the orchestra.

multivitamin.

Origin USA

Source Multi-source

B-Complex: The vitamin B family is most famously involved in energy production and stress resistance. As well, recent research has shown that thiamine prevents the accumulation of Advanced Glycation Endproducts (AGEs), proteins warped by nonenzymatic reaction with sugars, in vitro (11); riboflavin reduces frequency and severity of migraine headaches in double-blind trials (12); niacinamide spares the amino acid tryptophan, helping to maintain levels of serotonin and thus increase melatonin production; pantothenic acid reduces symptoms of osteoarthritis, as shown in a double-blind trial (see also writeup for Pantethine) (14); and B6, B12, folic acid, and choline are involved in the methylation cycle, which helps reduce odds of heart disease and cancer by lowering the toxic amino acid homocysteine and elevating levels of s-adenosyl methionine (SAMet) – see writeups for Methyl Donors and SAMet.

Choline and Inositol: These B-vitamin-like compounds are the raw materials with which the body produces the vital phospholipids phosphatidylcholine (PC) and phosphatidylinositol (PI), which are required to maintain the fluidity of cell membranes. As animals age, their levels of these phospholipids decrease, and cell membranes become less flexible, leading to impaired absorption of nutrients and release of waste products. They are thus known as lipotropic factors, which help rid the liver of excess fat (13). As well, these nutrients play an important role in cognitive function. Double-blind, placebo-controlled trials in humans show that choline increases verbal memory by increasing endogenous synthesis of the neurotransmitter acetylcholine (ACh) (32), while inositol (in the form of PI) is required for the normal functioning of serotonin and ACh, and is reported to be useful in anxiety, panic disorders, and obsessive compulsive disorders (OCD), possibly by actions on the same receptors as benzodiazepines (Valium, etc) (33).

Vitamin C: A standby of preventative medicine since the earliest days of orthomolecular research, ascorbic acid is perhaps best known for its role in prevention and amelioration of the common cold. It is now well-established that at least 500mg of ascorbate are required to manifest these effects, making the full 1000 mg of vitamin C in Maxxum 4 vital. Contrary to popular anti-supplement allegations, there is no evidence that high vitamin C intake increases iron absorption or risk of kidney stones (16). Vitamin C also appears to reduce cardiovascular mortality through elevating HDL while lowering LDL oxidation and blood pressure (16), as well as the more recently discovered lipoprotein a (Lp(a)) (17) – see writeup for Kelator C.

Bioflavonoids: These potent polyphenol antioxidants are closely involved in the actions of vitamin C. Albert Szent-Gyorgyi, the discoverer of vitamin C, identified bioflavonoids when a case of nosebleeding induced by capillary wall fragility, which was refractory to treatment from pure, synthetic ascorbate, cleared up in response to a natural vitamin C extract from lemon and red pepper. This led to his isolation of

bioflavonoids, which he called "vitamin P" and believed to be essential cofactors in vitamin C's activity. Bioflavonoids recharge vitamin C when it is oxidized in quenching free radicals (18). The beneficial actions of wonder foods and nutrients such as ginkgo, green tea, grapeseed extract, and Pycnogenol are due primarily to their **bioflavonoid** content. The Zutphen Elderly Study (19), published in *The Lancet*, and a similar study in *BMJ*, (20) found that total flavonoid intake was inversely correlated with heart **disease**, probably because of their inhibition of LDL oxidation (21) -- a phenomenon which may underlie the "French Paradox." Quercetin has been singled out for its *in vitro* inhibition of cancer cells (22), and even more so for its anti-allergenic properties, in reducing histamine release by mast cells (23) and inhibiting production of pro-inflammatory eicosanoids (24). As well, Quercetin has antiviral properties, inhibiting replication, infectivity, or transcription of HIV, herpes simplex I, and type I polio virus (25).

Vitamin D: In the form of cholecalciferol (D3), which is more readily converted into the true hormone form of vitamin D (1,2,5-dihydroxy cholecalciferol) than the D2 commonly found in fortified dairy products. Vitamin D plays a vital role in calcium absorption and bone formation, along with controlling cellular proliferation in mucosal tissues such as those of the colon. Indeed, *in vitro*, vitamin D inhibits growth of prostate cancer cells (26). Interestingly, epidemiology (27) suggests that men living at more northern latitudes -- who are likely to get less sun exposure -- are more likely to die of prostate cancer. The myth that vitamin D is plentifully available from endogenous production after exposure to sun neglects the simple fact that deficiency was common amongst children before the advent of fortified milk: children, after all, receive a great deal more sunlight than do adults, and health-conscious individuals are wisely avoiding direct sun exposure in any case.

Vitamin E: This is a vitamin for which the dose and form are particularly crucial. The International Unit (IU) was established as a measure of biological activity based on the relative ability of different forms of the vitamin to inhibit fetal resorption in rats. As a result, it was mistakenly concluded that the total biological activity for all purposes was equivalent to this measure. Thus, one IU was defined as 1mg of synthetic d,L-alpha tocopherol, equal to 0.67 mg of natural d-alpha. However, new research with deuterium-tagged tocopherols, mostly performed at the National Research Council of Canada (28), demonstrates that, milligram per milligram, natural alpha tocopherol is two to five times better retained in plasma and tissue than the synthetic product, with levels building up over the course of weeks and months. Thus, the IU value is misleading: one IU of synthetic E is not equal to one IU of natural d-alpha. In a placebo-controlled study, Jialal and colleagues found that supplementation with at least 400 IU was necessary to significantly lower LDL cholesterol oxidation (29) : doses of 60 and 200 IU were ineffective. So we are hardly surprised by seeming conflicts in trials evaluating the effectiveness of vitamin E supplements against heart **disease**. For instance, CHAOS (the Cambridge Heart Antioxidant Study) randomized over 2000 victims of coronary arteriosclerosis to receive either natural E (400 to 800 IU), or a placebo, and found a 77% reduction in the risk of non-fatal myocardial infarct in the active group (30). Yet an Italian trial (Gruppo Italiano per lo Studio della Sopravvivenza nell'Infarto miocardio (GISSI)), using 300 IU of synthetic E in patients who had already experienced one MI, found no significant reduction in risk of cardiovascular or other death in the group randomized to receive the E alone. Granted our new knowledge on dose and form, however, the reasons for the apparent discrepancy seem clear.

Vitamin K: The name of this essential nutrient was coined from the German "Koagulation," due to its involvement in maintaining healthy blood coagulation function. Today, however, most practitioners are interested in vitamin K for its support of bone formation, via its involvement in the synthesis of osteocalcin, a skeletal calcium-depositing protein, and its resulting epidemiological link to higher bone mineral density. A recently-reported prospective analysis from the Nurses' Health Study (34) reported that women in the higher quintiles of vitamin K intake had nearly one-third lower chance of hip fracture compared with women in the lowest quintile when adjusted for age. A major source of total vitamin K in the body is synthesis by probiotic bacteria, so patients taking antibiotics may be at particular risk for low vitamin K status. Maxxum 4 has vitamin K as phylloquinone, a natural form of this vitamin.

Calcium: The calcium in Maxxum 4 is in the form of a citrate-malate, a vegetarian form with a fractional absorption reported to be exactly half again as high as the well-absorbed calcium citrate (35), even though the citrate was taken with a meal and the citrate-malate on an empty stomach! Clinical trials (57) show clearly that this higher bioavailability does translate into greater increases in, or maintenance of, bone density (depending on the site) compared to other vegetarian calcium forms.

Magnesium: This mineral is surprisingly underrepresented in the Standard American Diet (SAD), with up to 65% of men and 85% of women in the US consuming under the (low) Recommended Daily Allowance of 400 Mg (36). Yet magnesium performs many vital functions in the body, aiding calcium absorption and utilization and acting as a natural calcium channel blocker. One trial (37) in hypertensive patients showed a decrease in systolic (154 to 146) and diastolic (100 to 92) blood pressure after nine weeks of supplementation with 360mg of magnesium. Today, it is also widely acknowledged that even mild magnesium deficiency can induce **cardiac arrhythmia** (38). Magnesium is vital to skeletal health. A recent trial (39) reported that women supplementing 250-750mg of magnesium daily either showed no bone loss (75% of subjects) or gained bone density (ranging from 1-8%), while unsupplemented women uniformly lost 1-3% of their bone mass. The mineral is also required for the formation of joint-lubricating **hyaluronic acid**. Magnesium also plays a recently-recognized, vital role in maintaining insulin sensitivity, with clinical trials showing improved insulin acute insulin response and faster glucose clearance in supplemented NIDDM patients (40). The excitement has been sufficient that ads are beginning to appear in Diabetes and other medical journals promoting magnesium supplements marketed by the pharmaceutical industry. The magnesium is again in the preferred vegetarian form of citrate-malate.

Manganese: This mineral is central to the activity of the mitochondrial form of superoxide dismutase (mtSOD). Superoxide is formed directly at the mitochondrial membrane as a result of singlet oxygen generation during the production of adenosine triphosphate, the cellular energy molecule. It is also necessary for carbohydrate and lipid metabolism, and for forming the organic mucopolysaccharide matrix of cartilage.

Zinc: Zinc is used in over 200 bodily enzymes, including the enzyme that uses Trimethylglycine (see writeup in main line product binder) to convert homocysteine to methionine (**betaine**-homocysteine methyltransferase) (41), along with enzymes involved in nucleic **acid** synthesis, and plays a role in cell membrane structure and function. Zinc is vital for healthy function of the immune system. In one study, older Americans given a zinc supplement showed improved antibody response and higher levels of circulating T-cells relative to controls (42). Prasad (43) reported that senior citizens with normal plasma zinc could still have inadequate zinc

in their granulocytes and lymphocytes. When these patients were supplemented with 30mg zinc for six months, several key immune indicators were elevated, including a 40% increase in thymulin levels and a near doubling of interleukin-1. SAD typically provides only 46-63% of the low RDA for zinc (44), with 90% of older persons at sub-RDA levels. Further, high-fiber diets, which are certainly advisable for the health of the colon, as well as control of blood lipids and glucose, do have the disadvantage of reducing zinc bioavailability because of their high phytic acid content (53). The monomethionate form of zinc has the advantage of high bioavailability, even in the presence of high phytic acid levels (45), eliminating the possible conflict between these two vital dietary components.

Copper: Copper, along with zinc, forms the cytosolic form of superoxide dismutase (CuZnSOD), our primary defense against the deadly superoxide radical. It is also needed for bone development and hemoglobin formation. It is especially important for persons taking zinc supplements to also get adequate copper intake, as an imbalance can lead to loss of control of blood pressure, cholesterol, and glucose metabolism (46). This does not mean that zinc supplements are "bad," but that balance is essential.

Selenium: This rare trace mineral has powerful epidemiological links to resistance to cancer (47). Indeed, in a double-blind, placebo-controlled study published in JAMA (48) a 200 micg selenium supplement slashed total cancer mortality in half, cut total cancer incidence by nearly 40% (including, specifically, cancers of the lung, colon, and prostate), and non-significantly reduced all-cause mortality by 17%, although it had no effect on pre-existing skin cancers. It also helps recharge vitamin E when it is oxidized in the process of executing its antioxidant function, and contributes to the formation of the vital antioxidant and detoxifying enzymes glutathione (GSH) and glutathione peroxidase (GSH-Px). As with so many minerals, the form of selenium is vital. Sodium selenite is an excellent elevator of GSH, but is unfortunately highly toxic at dosages only a few times greater than that required to avoid deficiency. Further, selenite is unstable in the presence of vitamin C, which degrades it into forms which do not inhibit chemical carcinogenesis (49). By contrast, selenomethionine is not subject to ascorbate-induced instability, yet is an excellent form to increase these vital enzymes (50).

Chromium: Chromium, when bound to niacin in its trivalent form, forms the so-called glucose tolerance factor (GTF), a factor needed to ensure proper insulin potency (51), thus avoiding the creeping progression of insulin resistance. This mineral is depleted by intensive exercise.

Vanadium: Vanadium is an essential trace mineral involved in glucose metabolism. Vanadium supplements mimic the action of insulin through an alternative intracellular glucose-metabolic pathway (54). Pilot trials suggest that vanadium supplements are helpful in diabetes (58). Maxxum 4's vanadium is bound to an organic ligand: organically-bound vanadium has been found more effective than vanadium salts such as vanadyl sulfate, the current norm in vanadium supplementation (59).

Molybdenum: An essential trace mineral, molybdenum also plays a central role in the formation and strength of bone. Molybdenum has been shown to be chemopreventative in rats, and epidemiology links higher molybdenum intake to reduced rates of dental caries in children (52).

What Maxxum 4 does not contain is as important as what it does. There

is no iron in the formula. While women who are still cycling lose iron every month in their menstrual period, postmenopausal women and men of any age may actually tend to accumulate excessive iron, particularly when eating a high-meat diet rich in heme iron. Unbound iron (ferritin) can be a powerful pro-oxidant by catalyzing the virulent fenton reaction, in which free iron reacts with the comparatively innocuous hydrogen peroxide to form the insatiable hydroxyl radical (OH[·]). This probably explains the epidemiological link between serum ferritin and risk of myocardial infarct (MI) (56), and may contribute to the higher rate of MI experienced by males and postmenopausal women compared to women still undergoing menstruation, as well as the lower rate of heart **disease** found amongst vegetarians, whose iron intake is lower. Patients experiencing anemia or who are otherwise low on iron may take iron separately, or be placed on a protocol including Lactoferrin (see writeup for this product), but Maxxum 4 does not include them for the long-term health of most patients.

Providing the optimal dose, form, and balance of these vital nutrients, Maxxum 4 is core nutritional support for your patients.

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